Air Quality Permitting
Technical Memorandum

TIER II Operating Permit No. 001-00029

St. Luke's Regional Medical Center
Boise, Idaho

Prepared by: Kent Berry
Environmental Quality Management

PROJECT NO. T2-010035

March 14, 2002

FINAL PERMIT

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LIST OF ACRONYMS

acfm	Actual Cubic Feet Per Minute
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
BACT	Best Available Control Technology
Btus	British Thermal Units
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DEQ	Idaho Department of Environmental Quality
dscf	Dry Standard Cubic Feet
EF	Emission Factor
EFB	Electrified Filter Bed
EPA	Environmental Protection Agency
gpm	Gallons Per Minute
gr	Grain (1 lb = 7,000 grains)
HAPs	Hazardous Air Pollutants
IDAPA	Idaho Administrative Procedures Act
km	Kilometer
lb/hr	Pound Per Hour
MACT	Maximum Available Control Technology
MMBtu	Million British Thermal Units
NESHAP	Nation Emission Standards for Hazardous Air Pollutants
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NSPS	New Source Performance Standards
O_3	Ozone
O&M	Operations and Maintenance
PM	Particulate Matter
PM_{10}	Particulate Matter with an Aerodynamic Diameter of 10 Micrometers or Less
ppm	Parts Per Million
PSD	Prevention of Significant Deterioration
PTC	Permit To Construct
PTE	Potential To Emit
SCC	Source Classification Code
scf	Standard Cubic Feet
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
TSP	Total Suspended Particulates
T/yr	Tons Per Year
µm	Micrometers
VOC	Volatile Organic Compound

PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.404.04, *Rules for the Control of Air Pollution in Idaho,* for issuing Tier II operating permits.

PROJECT DESCRIPTION

St. Luke's Medical Center (St. Luke's) is proposing to renew their Tier II operating permit and increase the operating hours for burning No.2 fuel oil for their boilers.

Modeling analysis indicates that St. Luke's can only operate one of the four boilers at a time. The operation hours of burning No.2 fuel oil of the boiler are limited based on sulfur content of the No.2 fuel oil.

The facility would normally be required to obtain a Permit to Construct (PTC) and revise their existing Tier II operating permit (#001- 00029, issued on August 15, 1996). Due to the current energy challenges in Idaho, this project was initially processed as a permitting consent order, but was never finalized.

SUMMARY OF EVENTS

On February 9, 2001, the Idaho Department of Environmental Quality (DEQ) received a self-exemption request from St. Luke's for increase of operation hours of burning No.2 fuel oil for the boilers. On February 26, DEQ received a letter serving as a permit application from St. Luke's, as the above referenced change did not qualify for self-exemption. DEQ received additional modeling information.

On April 23, 2001, DEQ sent St. Luke's a draft consent order allowing the increased usage of fuel oil (subject to a number of conditions) for an interim period until a revised Tier II permit was issued. The Consent order was not issued. On August 13, 2001, DEQ received an application from St. Luke's requesting a renewal of their Tier II operating permit and to allow the increased fuel oil usage as provided in the draft consent order. On November 20, 2001, DEQ deemed the Tier II application complete.

On December 20, 2002, DEQ issued a facility draft Tier II permit for review. No comments were received. A public comment period was conducted from February 8, 2002 to March 11, 2002; no comments were received.

DISCUSSION

1. Process Description

   The description of this facility and the equipment regulated in the permit have not changed since the original issuance of the Tier II operating permit (OP) in 1996. For facility and equipment description, refer to technical memorandum dated June 21, 1996 by Harbi Elshafei, DEQ Air Quality Engineer.

2. Emissions Estimates

   The emission calculations have not changed since the original issuance of the Tier II OP. For emission estimate information for this facility, refer to technical memorandum dated June 21, 1996, from Harbi Elshafei, DEQ Air Quality Engineer.

3. Modeling

   Mary Anderson, DEQ Air Modeler, conducted the modeling analysis. Table A and B list the summary of modeling results, the related calculations, the operation condition, and operation hours of burning No.2 fuel oil for the boiler.

Based on modeling results, St. Luke's can only operate one of the four boilers at a time. The number of operation hours of burning No.2 fuel oil will depend on the sulfur content of No.2 fuel oil. It cannot exceed 5.08/S hours per day, where S is the weight percentage of sulfur content (e.g., if the fuel is 0.5% sulfur, then S=0.5).

4. Facility Classification

The St. Luke's Regional Medical Center is not a major facility as defined in IDAPA 58.01.01.008. This AIRS classification for this facility is SM, which is defined as a synthetic minor facility with actual and potential emissions of regulated air pollutants below 100 tons per year.

5. Area Classification

St. Luke's Medical Center is located in Boise, Idaho, which is in Air Quality Control Region 64 which is designated as nonattainment for CO and unclassified for all other criteria air pollutants.

6. Regulatory Review

IDAPA 58.01.01.201 Permit to Construct Required

This project involves the modification of Boilers No. 1, 2, 3 and 4 to increase the allowable hours of operation, when firing diesel fuel, from 120 hours per boiler per year 480 hr/yr total to 818 hr/yr all boilers combined. This modification triggers Permit to Construct requirements and is incorporated into this Tier II permit renewal action.

IDAPA 58.01.01.210 Demonstration of Preconstruction Compliance with Toxic Standards

The increase in the number of hours of operation for burning No.2 fuel oil in the boiler does not change the hourly emissions rate of the toxic air pollutants (TAPs). The analysis of hourly and 24-hour ambient impact for the TAPs would be valid if the analysis had been conducted for the existing permit(s). Since the analysis is not in the exiting permit, in addition to annual ambient impact, 24-hour ambient impact is conducted. The analysis demonstrates that this modification complies with the toxic standards specified in IDAPA 58.01.01.210. Details of the analysis can be found in Table C of this memorandum.

IDAPA 58.01.01.401 thru 470 Tier II Operating Permit

The St. Luke's Regional Medical Center located in Boise, Idaho, operates under a Tier II operating permit number 001-00029. This permit was issued on August 15, 1996 and expired on August 15, 2001. This action is for the modification and renewal of this operating permit.

Table A Ambient Air Quality Analysis

Worst Case Scenario:
Sulfur Content of the No.2 fuel oil (S%) = 0.50%
Operating one boiler at a time [1]

Pollutant	Emissions Rate (lb/hr)	Maximum Hourly Concentration on unit emission rate of lb/hr ($\mu g/m^3$)	Averaging Period	Predicted Ambient Impact [2, 3, 4] ($\mu g/m^3$)	Background Concentrations ($\mu g/m^3$)	Maximum Ambient Impact plus Background Concentrations ($\mu g/m^3$)	Regulatory Standard ($\mu g/m^3$)	Compliant? (Y or N)
SO_2 [5]	15.02	55.70	3-hour	836.7	375	1211.7	1300	Y
		38.50	24-hour	578.3	120	**698.3**	365	The daily operation hours need to be limited based on the sulfur content of the No.2 fuel oil used.
		11.40	Annual	25.4	18.3	43.7	80	Y
NO_X	4.28	11.40	Annual	7.2	40	47.2	100	Y
PM_{10}	0.43	38.50	24-hour	16.6	123	139.6	150	Y
		11.4	Annual	0.7	31.6	32.3	50	Y

Table B Boiler Allowable Operating Hours

Establishing Number of Daily Operation Hours for Burning No. 2 Fuel Oil in the Boiler, Based on the Sulfur Content of the Supply of No. 2 Fuel Oil
Sulfur Content of the No.2 fuel oil **S%**
Operating one boiler at a time

Pollutant	Emissions Rate [6] (lb/hr)	Maximum Hourly Concentration on unit emissions rate of lb/hr ($\mu g/m^3$)	Averaging Period	Predicted Ambient Impact ($\mu g/m^3$)	Background Concentrations ($\mu g/m^3$)	Maximum Ambient Impact plus Background Concentrations ($\mu g/m^3$)	Regulatory Standard ($\mu g/m^3$)	Daily Operation Hours based on sulfur content in No.2 fuel oil cannot exceed [7] (hrs)
SO_2	30.04*S	38.50	24-hour	30.04*S*38.5*operation hours/24	120	30.04*S*38.5* operation hours/24 + 120	365	5.08/S

[1] Can only operate one boiler at a time otherwise SO_2 3-hour limit will be exceeded.
[2] Predicted ambient impact for 3-hour averaging period is calculated using: emissions rate (lb/hr)*55.7(µg/m3)
[3] Predicted ambient impact for 24-hour averaging period is calculated using: emissions rate (lb/hr)*38.5(µg/m3)allowable operation hours of burning No.2 fuel oil/24 (hr/day)
[4] Predicted ambient impact for annual averaging period is calculated using: emissions rate (lb/hr)*11.4(µg/m3)*(120*4+818) (hr)/8760 (hr/yr.)
[5] Emissions factor is 142*S for SO_2 and 2*S for SO_3 from AP-42, Table 1.3-1. SO_3 emissions are expressed as SO_2 using convertion:$2*S*SO_2/SO_3 = 1.6*S$
[6] SO_2 emissions estimation (lb/hr) based on sulfur content in the No.2 fuel oil: $29.29*10^6$ (Btu/hr)/140,000 (Btu/gal)*(142+1.6)*S (lb $SO_2/10^3$gal) = 30.04*S if the fuel is 0.5% sulfur, then S=0.5
[7] Set Maximum ambient impact + background = regulatory standard, solve maximum number of daily operation hours, results 5.08/S hrs/day

Table C Demonstration of Preconstruction Compliance with Toxic Standards

Toxic air pollutants emitted from the boilers while burning No.2 fuel oil		
Boiler rated capacity and	fuel data	
Maximum (rated) heat input rate	29.29	MM Btu/hr
No. 2 fuel oil heating value	140000	But/gal

Toxic air pollutants increments (IDAPA 58.01.01.585)					
Toxic air pollutant		averaging period	OEL (reference occupational exposure level, mg/m^3)	EL (Emissions screening level, lb/hr)[2]	AAC (acceptable ambient concentrations, mg/m^3)
Nitrous oxide (N_2O) [1]	non-carcinogenic	24-hour	90	6	4.5

Toxic air pollutants increments (IDAPA 58.01.01.586)					
Toxic air pollutant		averaging period	URF (unit risk factor from the US EPA)	EL (Emissions screening level) lb/hr	AACC (acceptable ambient concentrations, $\mu g/m^3$)
Polycyclic organic matter (POM)	carcinogenic	annual	7.3E-05	9.1E-05	1.4E-02
Formaldehyde (HCOH)	carcinogenic	annual	1.3E-05	5.1E-04	7.7E-02

Toxic air pollutants impact analysis					
Toxic air pollutant	Emissions Factor, $lb/10^3$ gal, AP-42 Table 1.3-8	emissions rate lb/hr [2, 3]	Maximum Hourly Concentration on unit emission rate of lb/hr ($\mu g/m^3$), annual [4]	Predicted Ambient Impact ($\mu g/m^3$) [5, 6]	Predicted Ambient Impact ($\mu g/m^3$) with operation limit of 1298 hr/yr [7]
Nitrous oxide (N_2O) [1]	0.11	2.3E-02			
Polycyclic organic matter (POM)	0.0033	6.9E-04	11.40	7.9E-03	---
Formaldehyde (HCOH)	0.048	1.0E-02	11.40	1.1E-01	1.7E-02

1. Since the modification does not change the hourly emissions of N_2O, normally no analysis for N_2O would have been required. However, DEQ conducted an analysis because the analysis required for the facility was not found in the existing permit.
2. Emissions rates of POM and HCOH are greater than their respective ELs, further analysis is eeded, per IDAPA 58.01.01.210.05, Emission rate of N_2O is less than its EL, no further demonstration is required, per IDAPA 58.01.01.210.05.
3. emissions estimation (lb/hr) = $29.29*10^6$ (Btu/hr)/140,000 (Btu/gal)*EF (lb /10^3gal)
4. Modeling results from Mary Anderson, DEQ Air Modeler
5. Predicted ambient impact ($\mu g/m^3$)= 11.40 $\mu g/m^3$ /((lb/hr) * emissions rate (lb/hr)
6. Uncontrolled predicted ambient impact of polycyclic organic matter is less than its AACC, no further demonstration is required per IDAPA 58.01.01.210.06
7. The controlled predicted ambient impact of formaldehyde is less than its AACC, no further demonstration is required per IDAPA 58.01.01.210.08.

IDAPA 58.01.01.577 Ambient Air Quality Standards for Specific Air Pollutants

The increase in the number of operation hours of burning No. 2 fuel oil in the boiler does not change the hourly emissions rate of the air pollutants. The analysis of hourly and 24-hr impact of CO, NO_X, and PM_{10} of the existing permits (issued on August 15, 1996 and June 20, 1994) is still valid.

The DEQ Air Modeler for the draft permitting consent order modeled SO_2 emissions, which was not done when the Tier II OP was issued on August 15, 1996. The modeling results indicate that some operating conditions need to be imposed to ensure that St. Luke's is in compliance with the 24-hr SO_2 National Ambient Air Quality Standard (NAAQS). The detailed analysis can be found in Table A and Table B.

40 CFR 52 Prevention of Significant Deterioration (PSD)

PSD requirements do not apply to St. Luke's because it is not a major facility as defined in IDAPA 58.01.01.008.10.

40 CFR 60 New Source Performance Standards (NSPS)

Boiler #3 and #4 are subject to 40 CFR 60 Dc. Detailed discussion can be found in Appendix B of this memorandum

40 CFR 61 & 63 National Emission Standards for Hazardous Air Pollutants (NESHAP) & Maximum Achievable Control Technology (MACT)

No subparts of 40 CFR 61 or 63 are applicable to diesel generators.

7. Permit Requirements

7.1 Emissions Limits

Due to the increase in the number of operation hours of burning No.2 fuel oil in the boilers, the annual emissions are increased. Table D lists the updated emissions limits for the four boilers. This table supersedes the table in the Tier II OP #001-00029, issued on August 15, 1996.

Table D Emission Limits

BOILER	PM		PM_{10}		NO_X		SO_2	
	lb/hr	T/Yr[1]	lb/hr	T/Yr[1]	lb/hr	T/Yr[1]	lb/hr	T/Yr[1]
Boiler #1	0.43	----	0.43	----	4.28	----	15.2	----
Boiler #2	0.43	----	0.43	----	4.28	----	15.2	----
Boiler #3	0.43	----	0.43	----	4.28	----	15.2	----
Boiler #4	0.43	----	0.43	----	4.28	----	15.2	----
Accumulate		0.28		0.28		2.8		9.9

[1] Accumulated annual emissions = hourly emissions (lb/hr) x total operation hours of burning No.2 fuel oil per year. In this case the total annual operation hours of burning No.2 fuel oil are 120 hrs x 4 + 818 hrs = 1,298 hrs.

7.2 Operating Requirements

See Permit Sections 3.4 through 3.9.

8. AIRS Information

AIRS/AFS FACILITY-WIDE CLASSIFICATION DATA ENTRY FORM

Air Program Description	SIP	PSD	NESHAP	NSPS	MACT	TITLE V	AREA CLASSIFICATION A – Attainment U – Unclassifiable N – Nonattainment
SO_2	SM						A
NO_x	SM						A
CO	B						N
PM_{10}	B						A
PM (Particulate)	B						
VOC	B						
THAP (Total HAPs)	B						
Other (specify below:)							
Recordkeeping of sulfur content of fuel oil				X			
VE/FE/FD *	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	

* **VE/FE/FD (VISIBLE EMISSIONS, FUGITIVE EMISSIONS, AND FUGITIVE DUST) ARE ENTERED FOR COMPLIANCE PURPOSES ONLY AND DO NOT REQUIRE EVALUATION BY THE PERMIT ENGINEER.**

AIRS/AFS CLASSIFICATION CODES:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For NESHAP only, class "A" is applied to each pollutant which is below the 10 ton-per-year (T/yr) threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.
SM = Potential emissions fall below applicable major source thresholds **if and only if** the source complies with federally enforceable regulations or limitations.
B = Actual and potential emissions below all applicable major source thresholds.
C = Class is unknown.
ND = Major source thresholds are not defined (e.g., radionuclides).
SIP: State Implementation Plan
Title V: Clean Air Act Title V Operating Permit
CO: Carbon Monoxide
VOC: Volatile Organic Compound
HAPs: Hazardous Air Pollutants

FEES

St. Luke's is not a major facility as defined in IDAPA 58.01.01.008.10. Therefore, registration fees are not applicable in accordance with IDAPA 58.01.01.527. A Tier II Fee of $500 was paid on February 28, 2002 in accordance with IDAPA 58.01.01.470.

RECOMMENDATION

Based on the review of the application materials, and all applicable state and federal regulations, staff recommends that DEQ issue a proposed Tier II OP to St. Luke's Regional Medical Center. An opportunity for public comment on the air quality aspects of the proposed OP shall be provided in accordance with IDAPA 58.01.01.404.01.c.

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cc: Matt Stoll, Boise Regional Office
Kent Berry, EQM
AQ Program Office
Sherry Davis, Technical Services